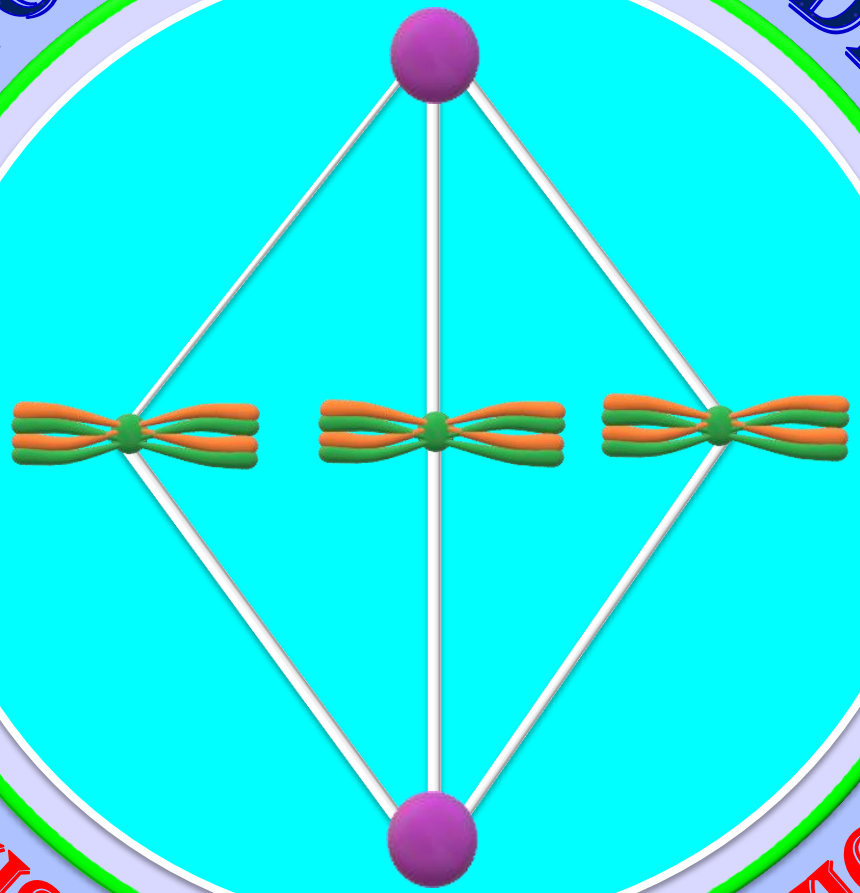
CELL CYCLE AND CELL DIVISION



MITOSIS AND ITS SIGNIFICANCE

Mitosis

Cell cycle

The sequence of events by which a cell duplicates its genome, synthesises the components of the cell and finally divides into two daughter cells is termed cell cycle.

B. John Ebenezer

Interphase

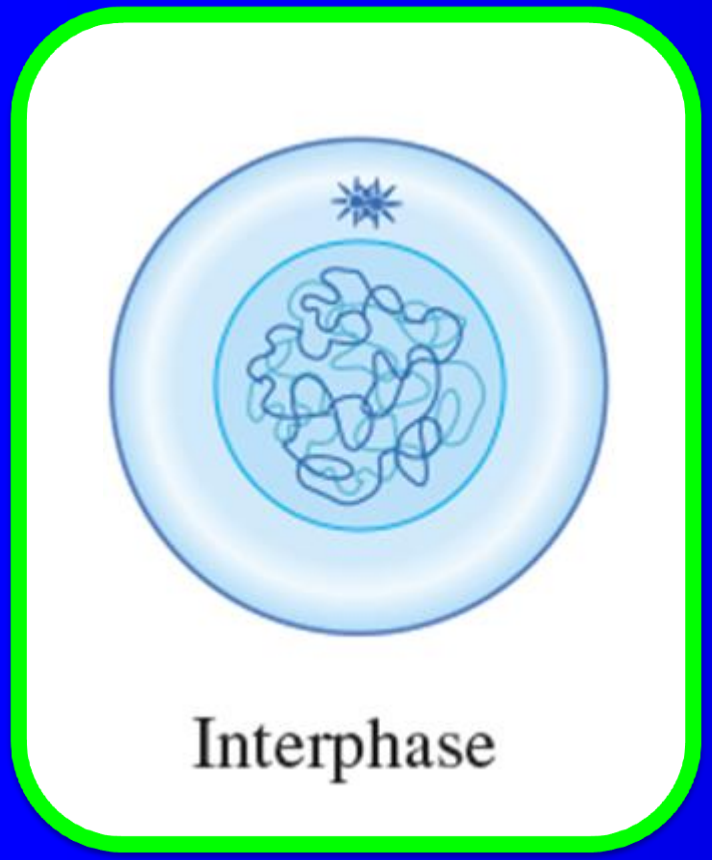
The interphase is the time during which the cell is preparing for cell division by undergoing both **cell growth** and **DNA replication** in an orderly manner. (It is also known as the resting phase)

M Phase or Mitotic Phase

The M Phase starts with the nuclear division, leading to the separation of daughter chromosomes **(karyokinesis)** and ends with division of cytoplasm **(cytokinesis)**

B. John Ebenezer

Interphase



G1 Phase

During G_1 phase the cell is metabolically active and **continuously grows** but **does not replicate its DNA**.

S or Synthesis phase

DNA synthesis or replication takes place.

G2 Phase

Proteins and **RNAs** are synthesised and the cell growth continues.

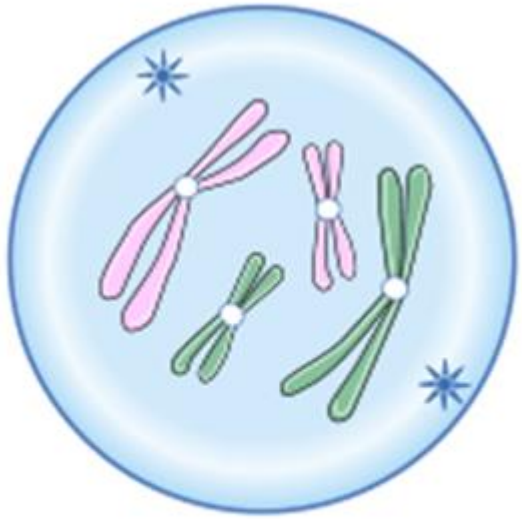
B. John Ebenezer

G_0 Phase

The cells that do not divide further exit G1 phase and enter an inactive stage called **quiescent stage** (G_0) of the cell cycle.

B. John Ebenezer

Prophase



Prophase

The **centrioles**, which had undergone duplication during S phase of interphase, now begins to **move** towards **opposite poles** of the cell.

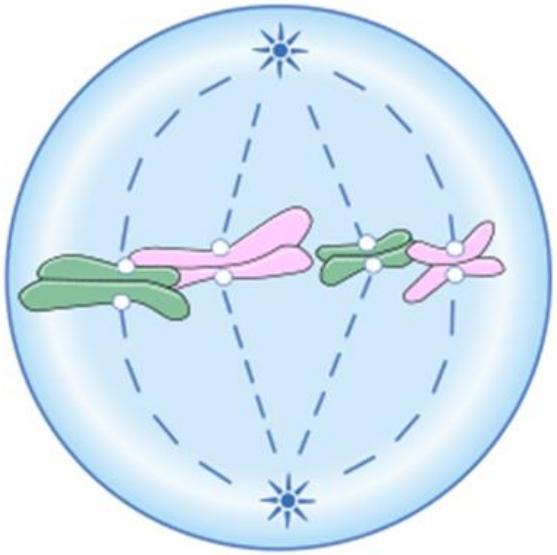
Condensation of chromosomes occur.

Chromosomes consist of **two chromatids** attached together at the centromere.

Golgi bodies, endoplasmic reticulum, nucleolus and the nuclear membrane disappear.

B. John Ebenezer

Metaphase



Condensation of chromosomes is completed and they can be observed clearly under the microscope.

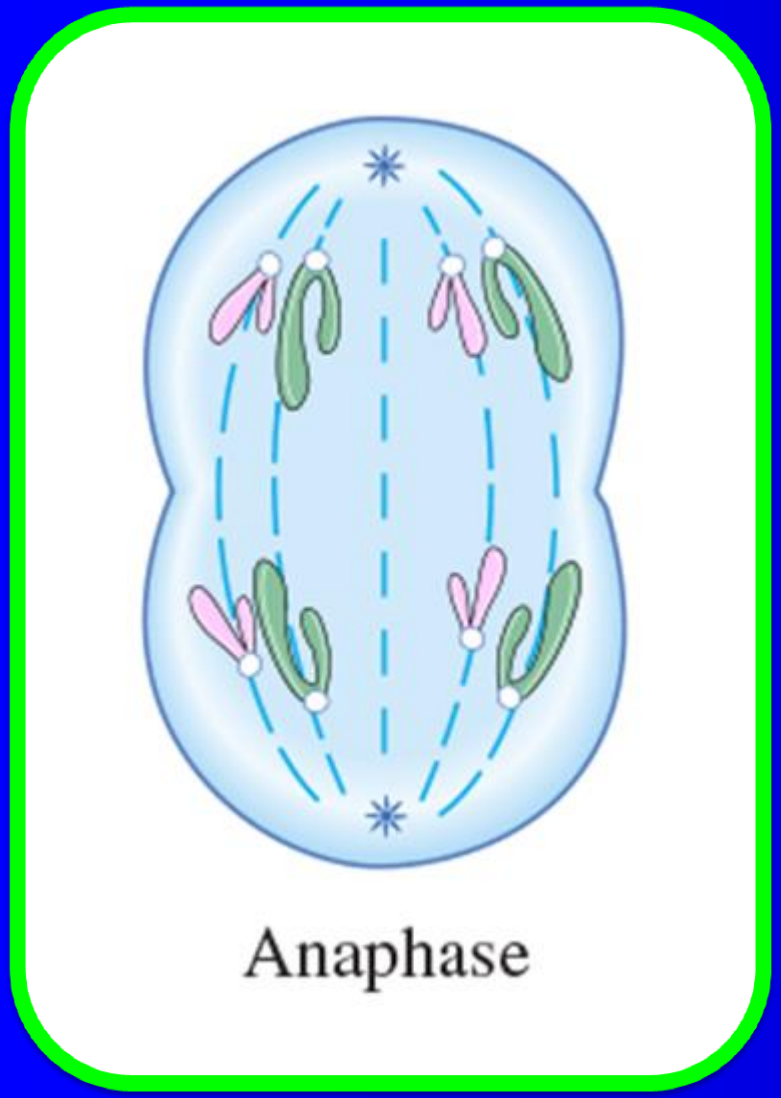
Small **disc-shaped structures** found at the surface of the centromeres are called **kinetochores**.

Chromosomes are arranged at the equator or centre.

Spindle fibres get attached at the kinetochores.

B. John Ebenezer

Anaphase

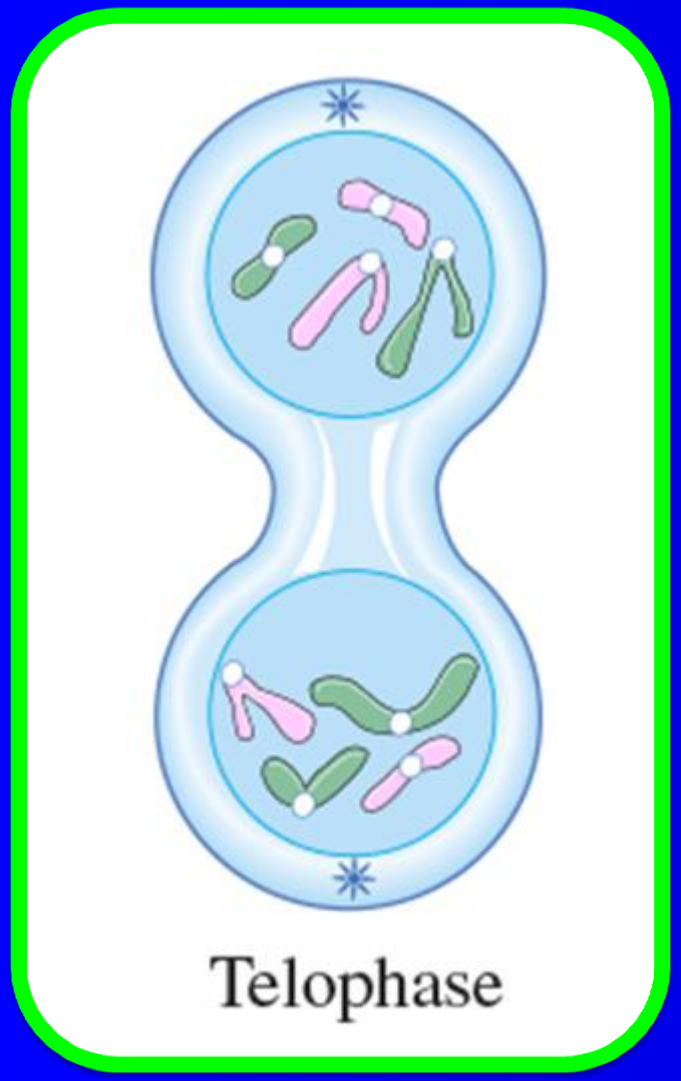


The spindle fibres contract.

Centromeres split and chromatids move towards the opposite poles.

B. John Ebenezer

Telophase



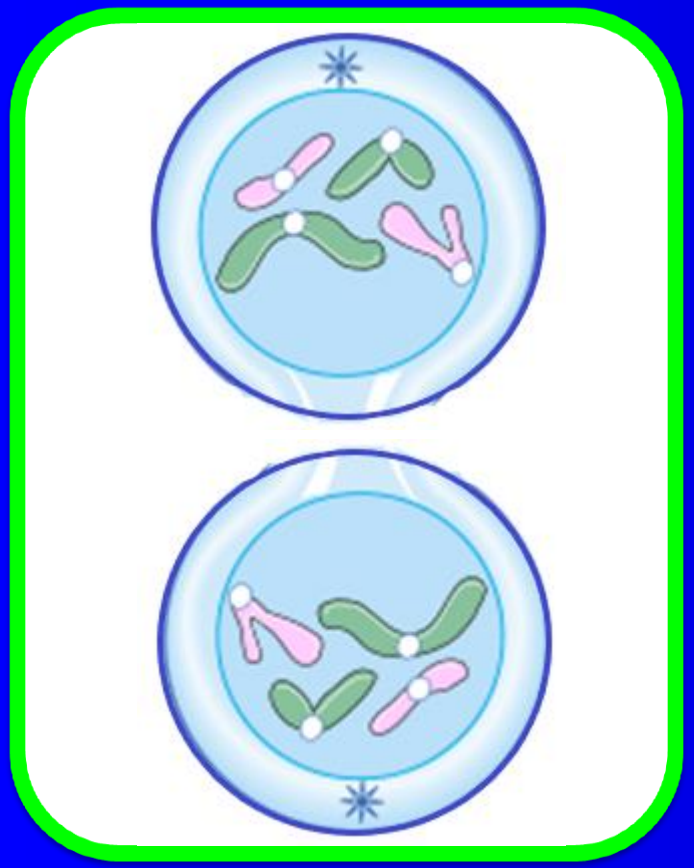
Chromosomes have reached the opposite poles. They decondense and lose their structure.

The chromatin material tends to collect in a mass in the two poles.

Nuclear membrane, Nucleolus, Golgi complex and ER reappear.

B. John Ebenezer

Cytokinesis



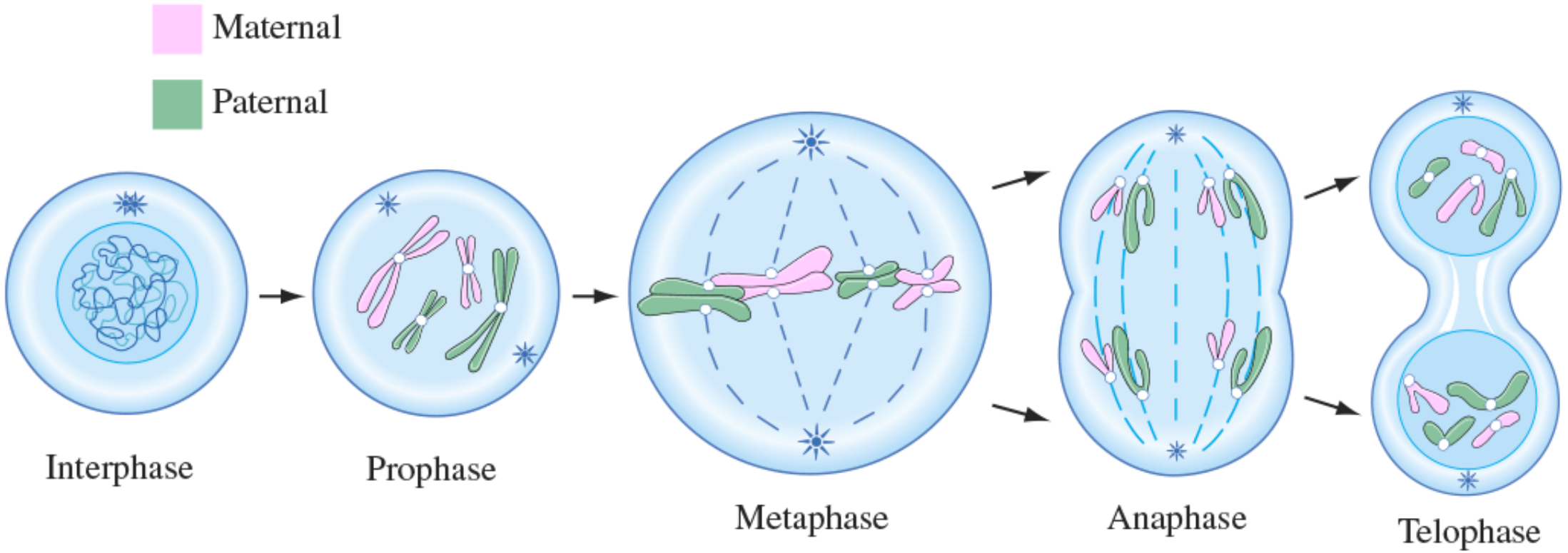
In animal cells, cytokinesis occurs by the appearance of a **furrow** in the plasma membrane.

The furrow gradually deepens and ultimately joins in the centre dividing the cell cytoplasm into two.

In plant cells, **wall formation** starts at the **centre** of the cell and grows outward to meet the existing lateral walls.

B. John Ebenezer

Mitosis



B. John Ebenezer

Significance of Mitosis

Mitosis helps in maintaining the same number of chromosomes in daughter cells after division.

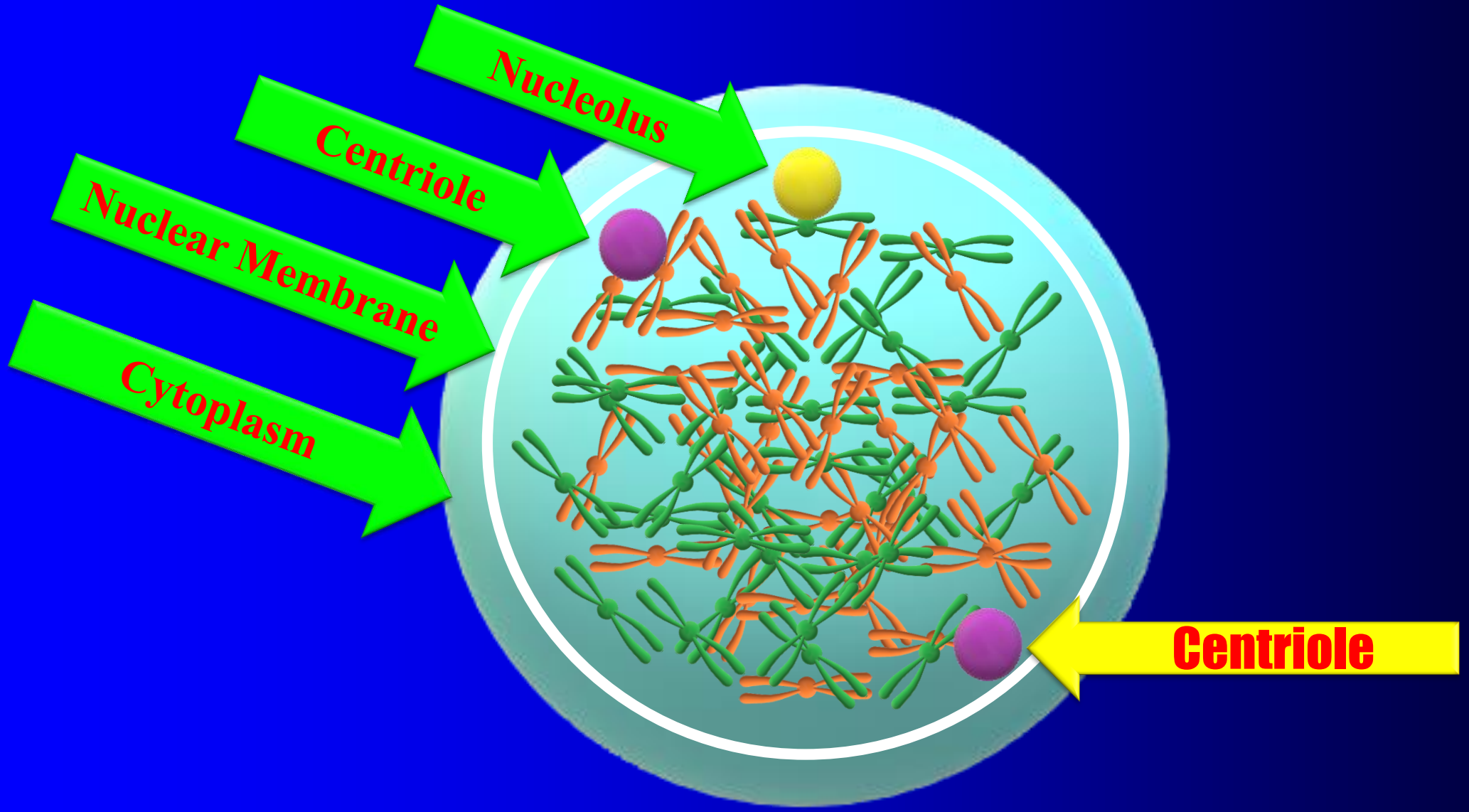
It is responsible for growth and development of multicellular organisms.

It helps in repairing of damaged tissues.

It helps the cell to maintain proper size.

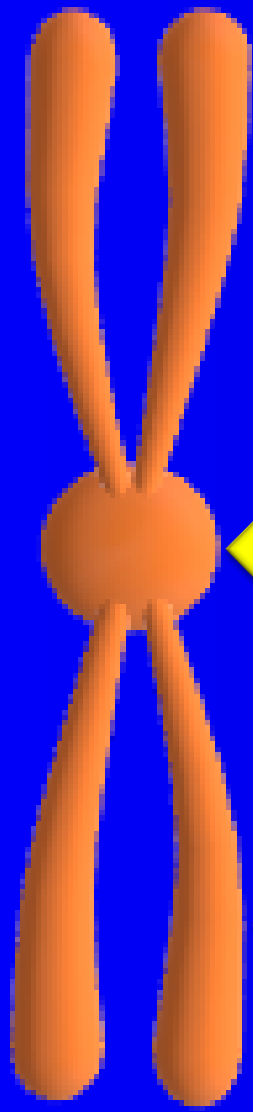
B. John Ebenezer

Cytoplasm and Nucleus



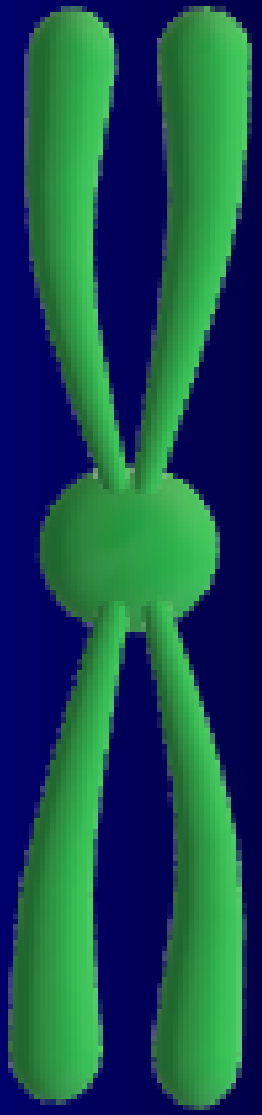
B. John Ebenezer

Chromosomes



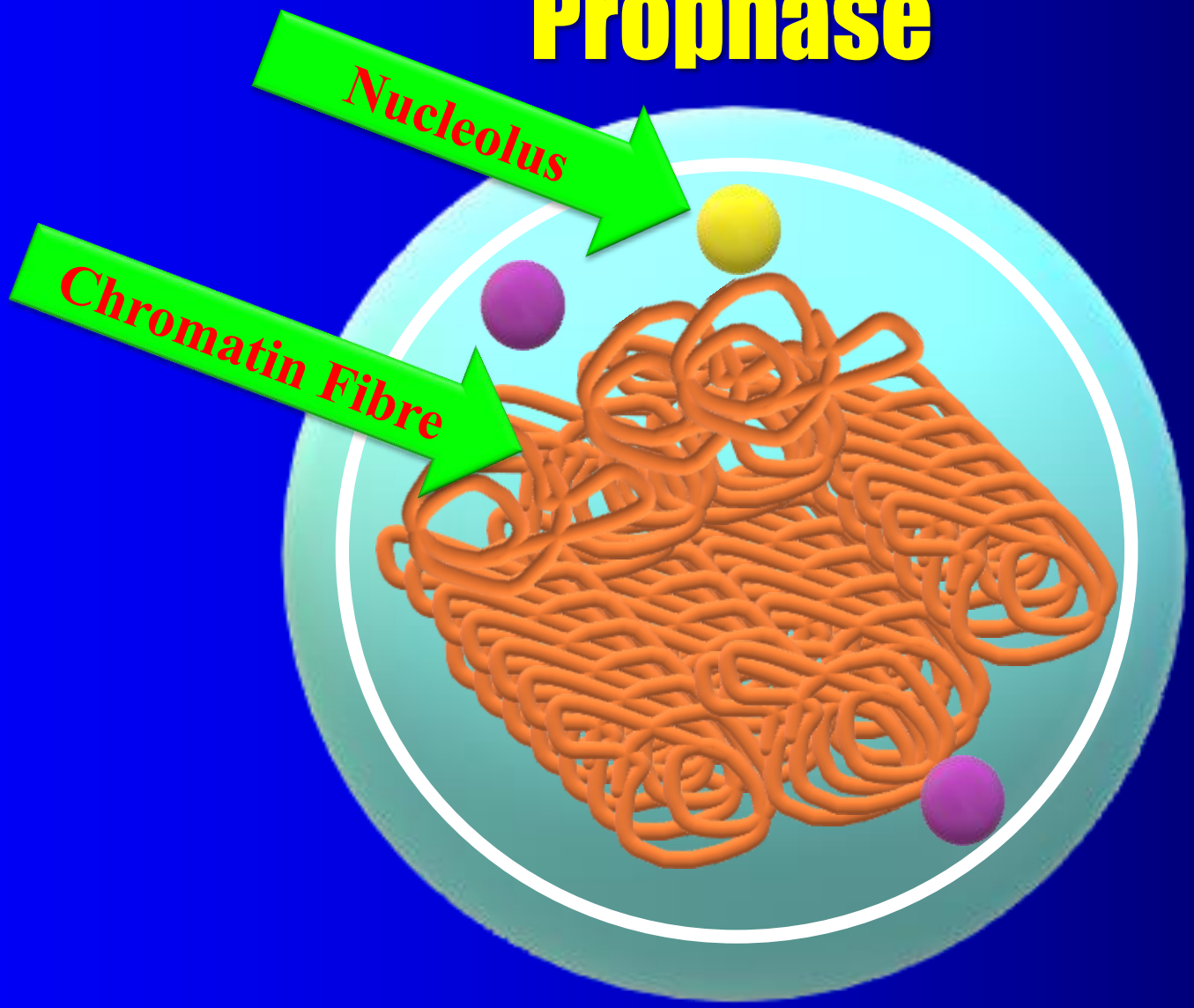
Centromere

Chromatid



B. John Ebenezer

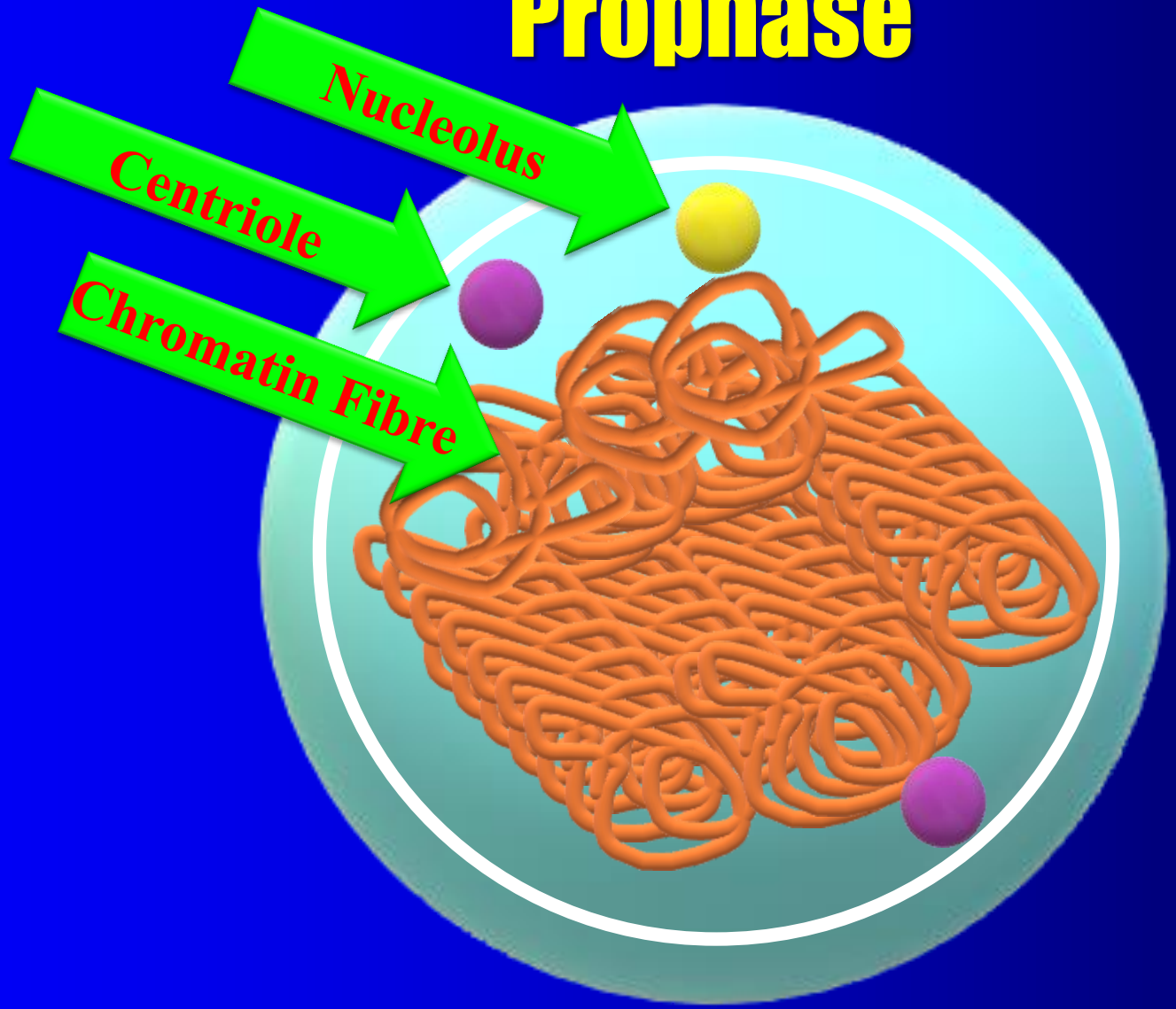
Prophase



Chromatin Fibres

B. John Ebenezer

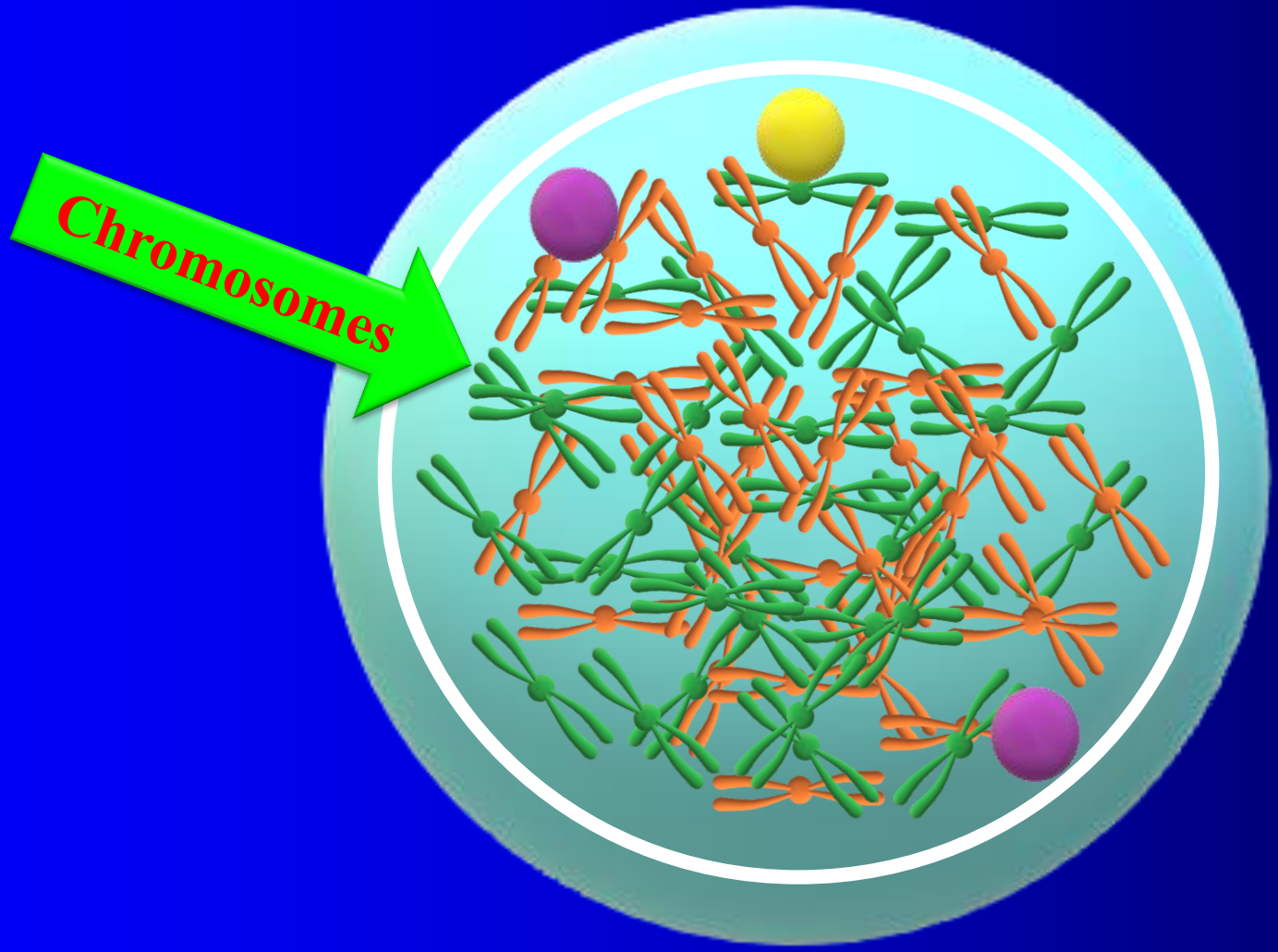
Prophase



Movement of Centrioles towards the poles

B. John Ebenezer

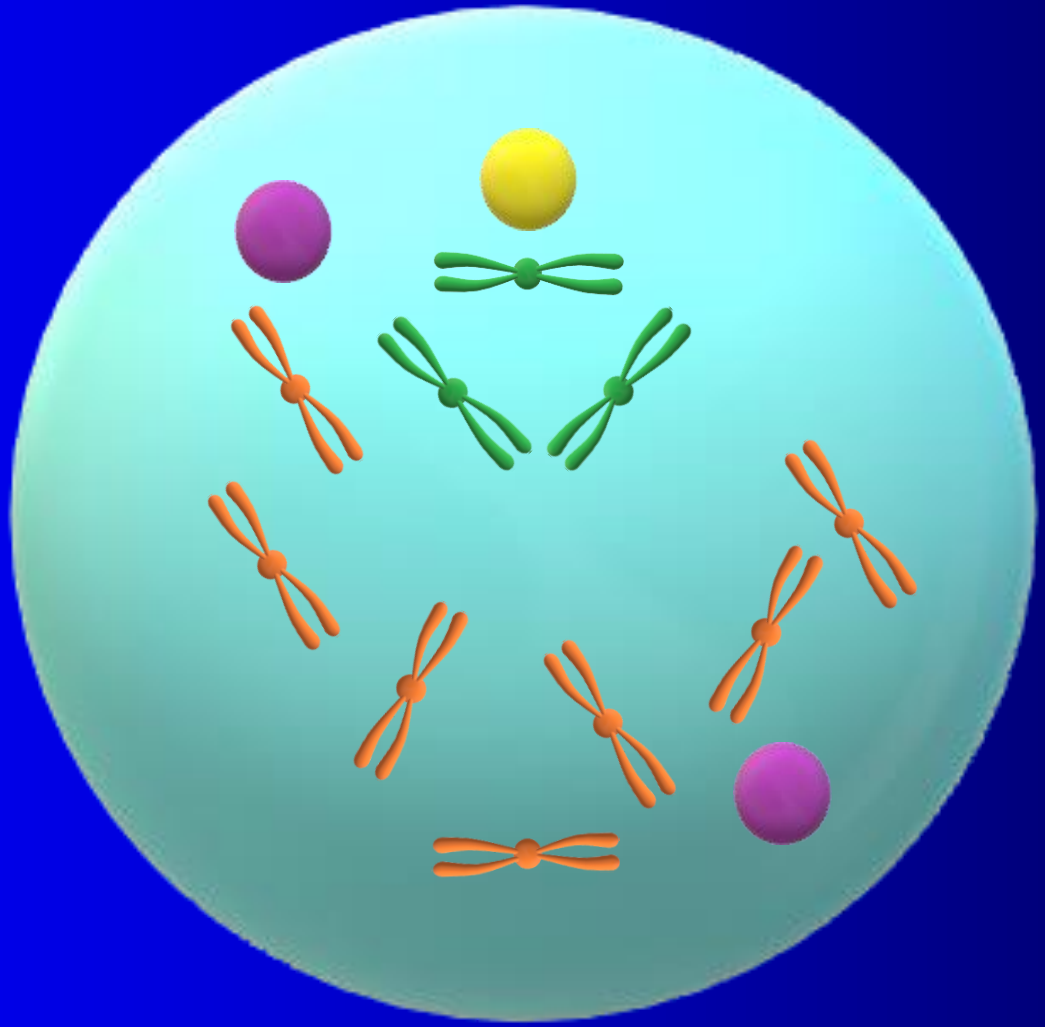
Prophase



Condensation of Chromosomes

B. John Ebenezer

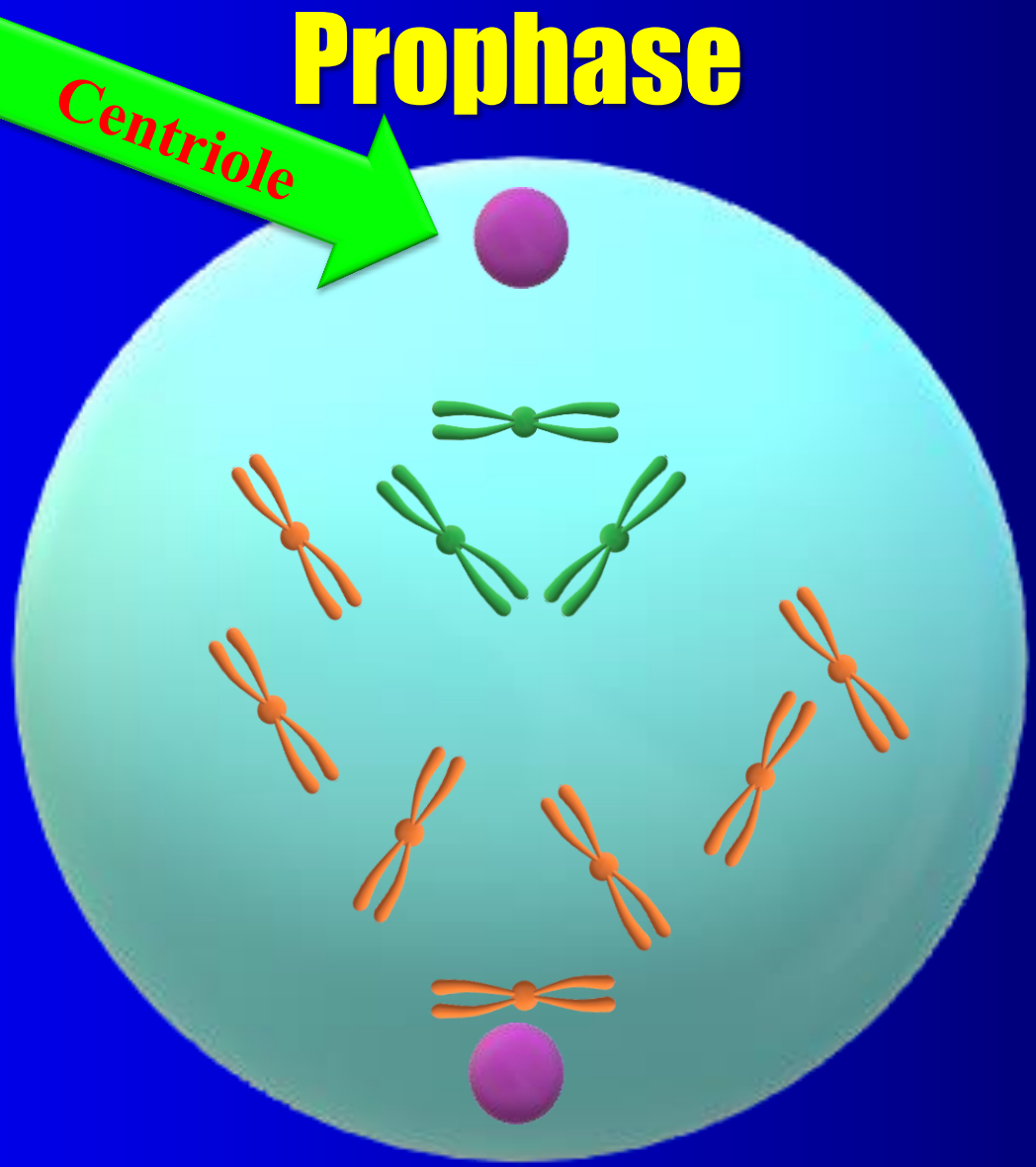
Prophase



Disappearance of Nuclear Membrane

B. John Ebenezer

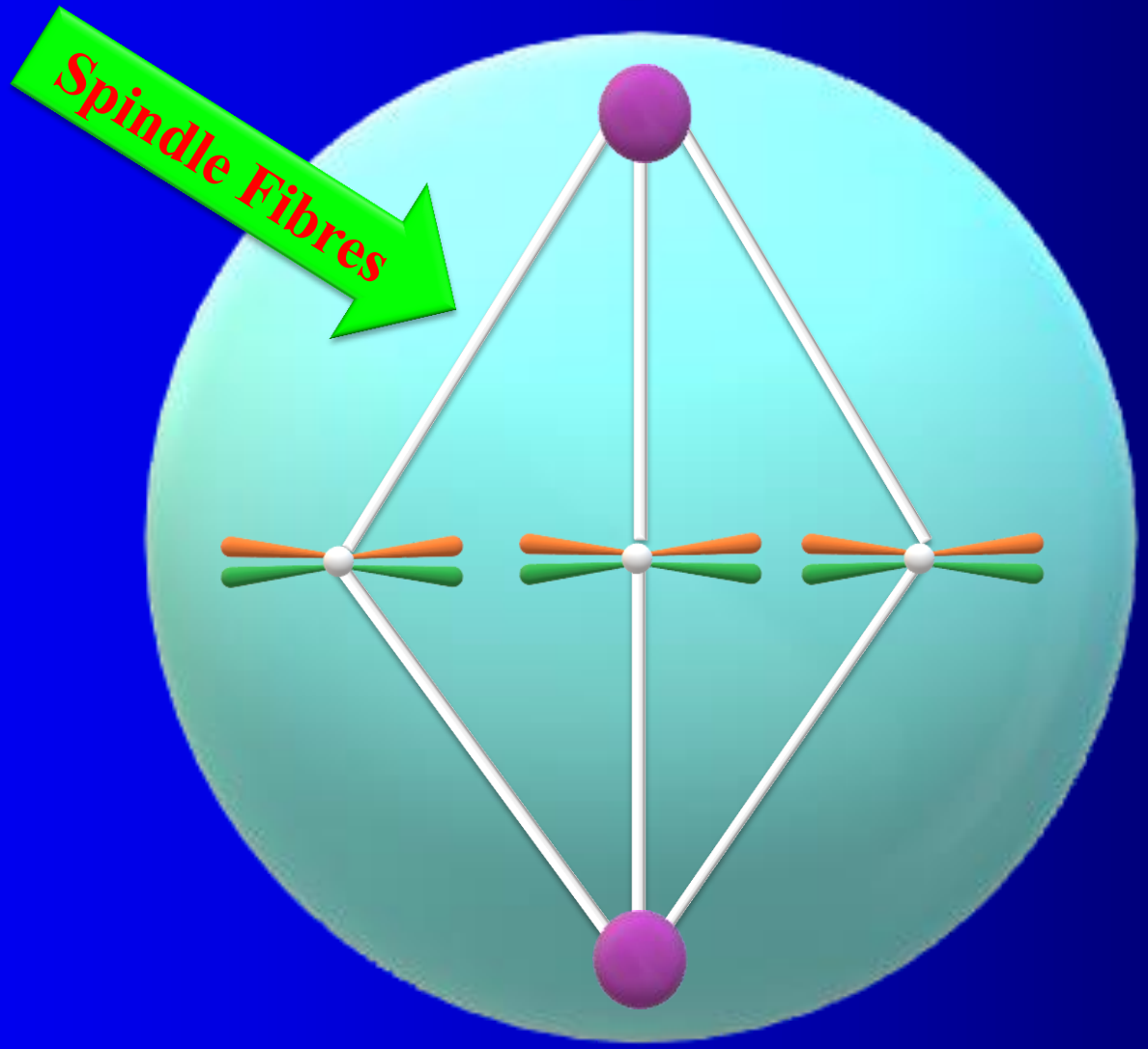
Prophase



Disappearance of Nucleolus

B. John Ebenezer

Metaphase

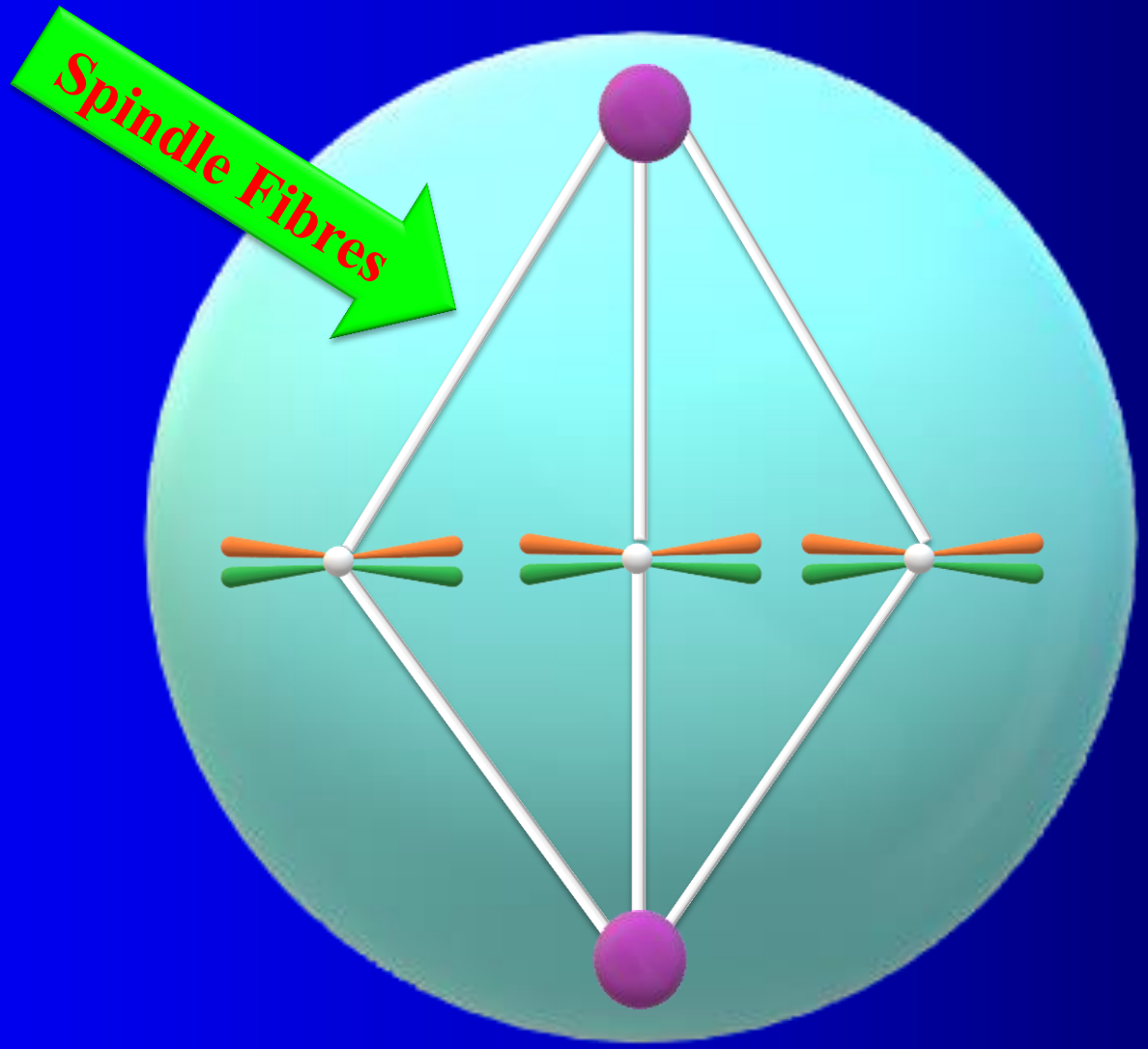


Alignment of Chromosomes at the Equator

Attachment of Spindle Fibres with the Centromeres

B. John Ebenezer

Metaphase

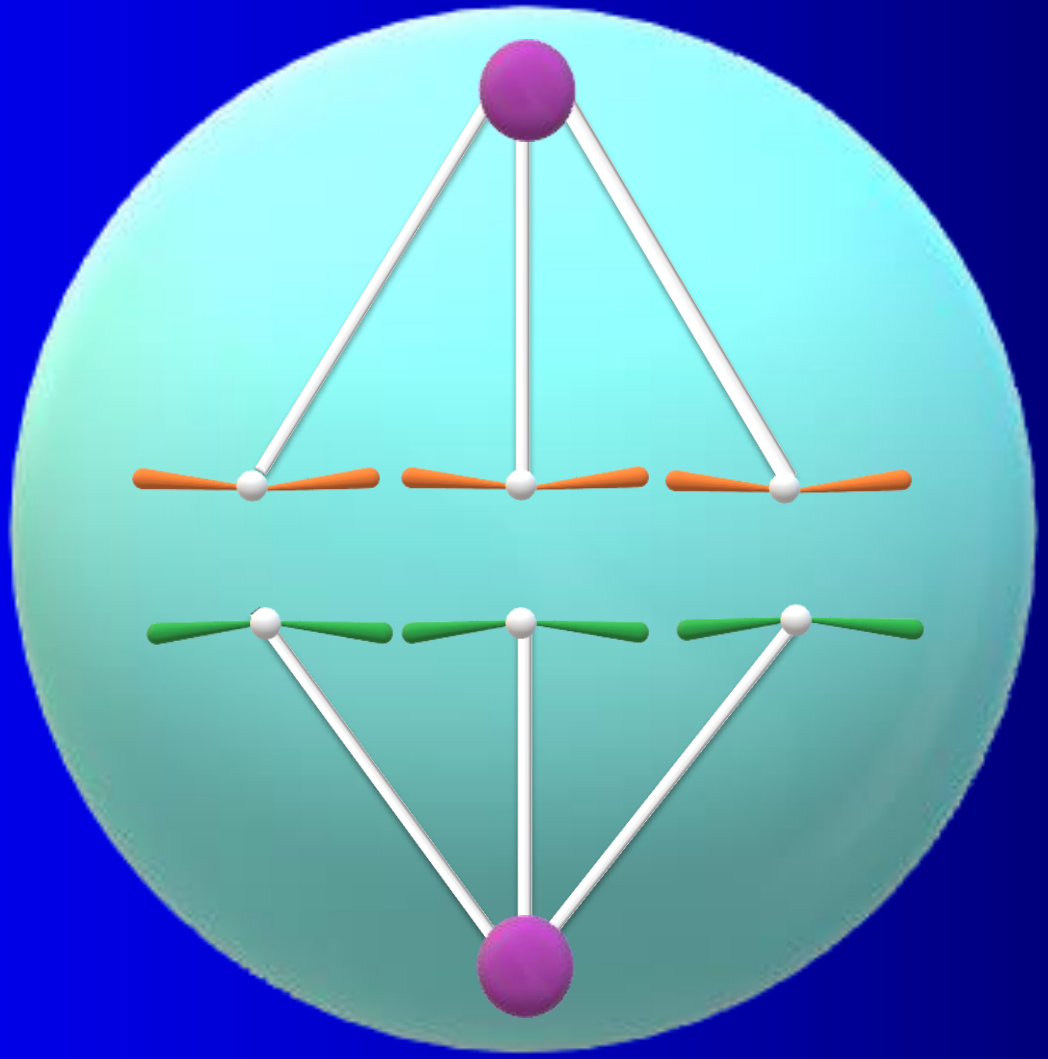


Alignment of Chromosomes at the Equator

Attachment of Spindle Fibres with the Centromeres

B. John Ebenezer

Anaphase



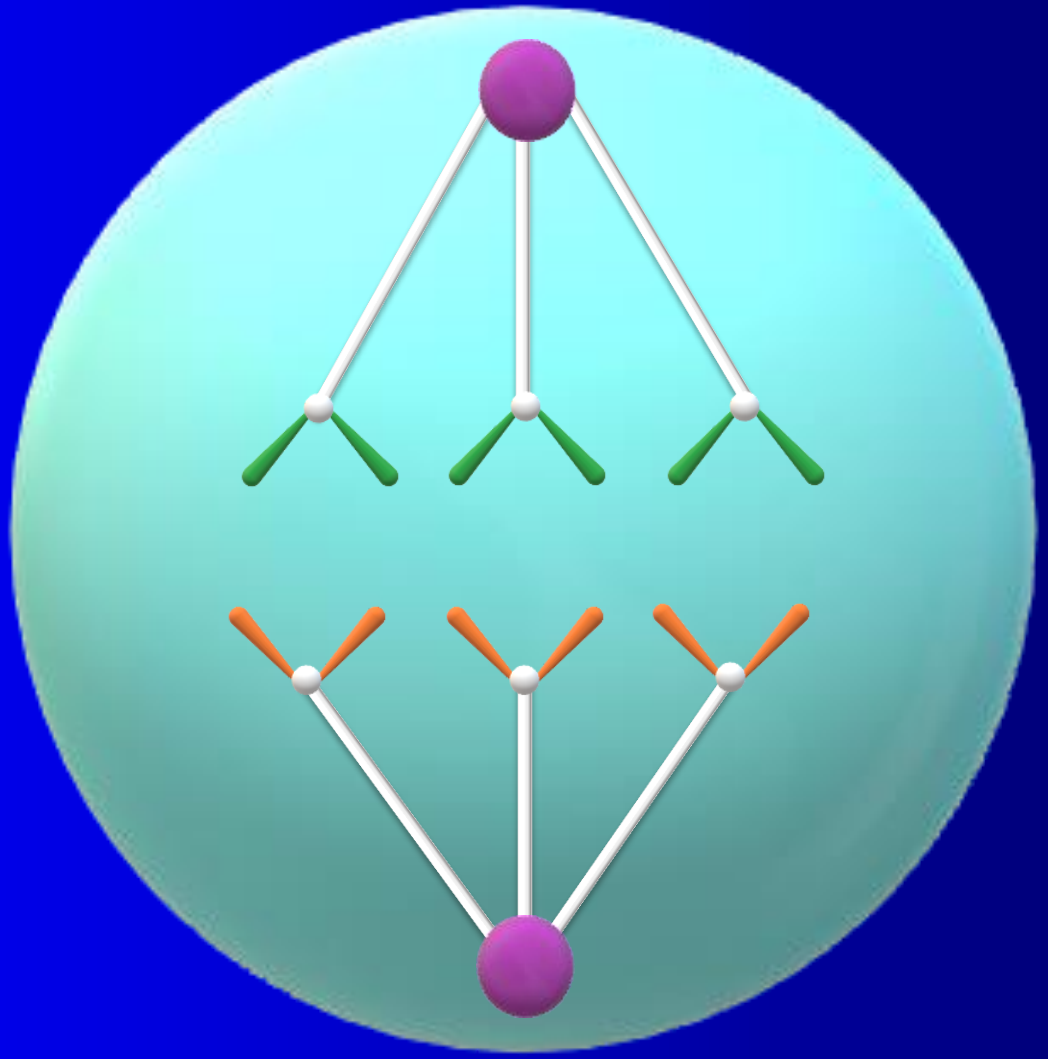
Contraction
of
Spindle Fibres

Splitting of
Centromeres

Movement of
Chromosomes

B. John Ebenezer

Anaphase



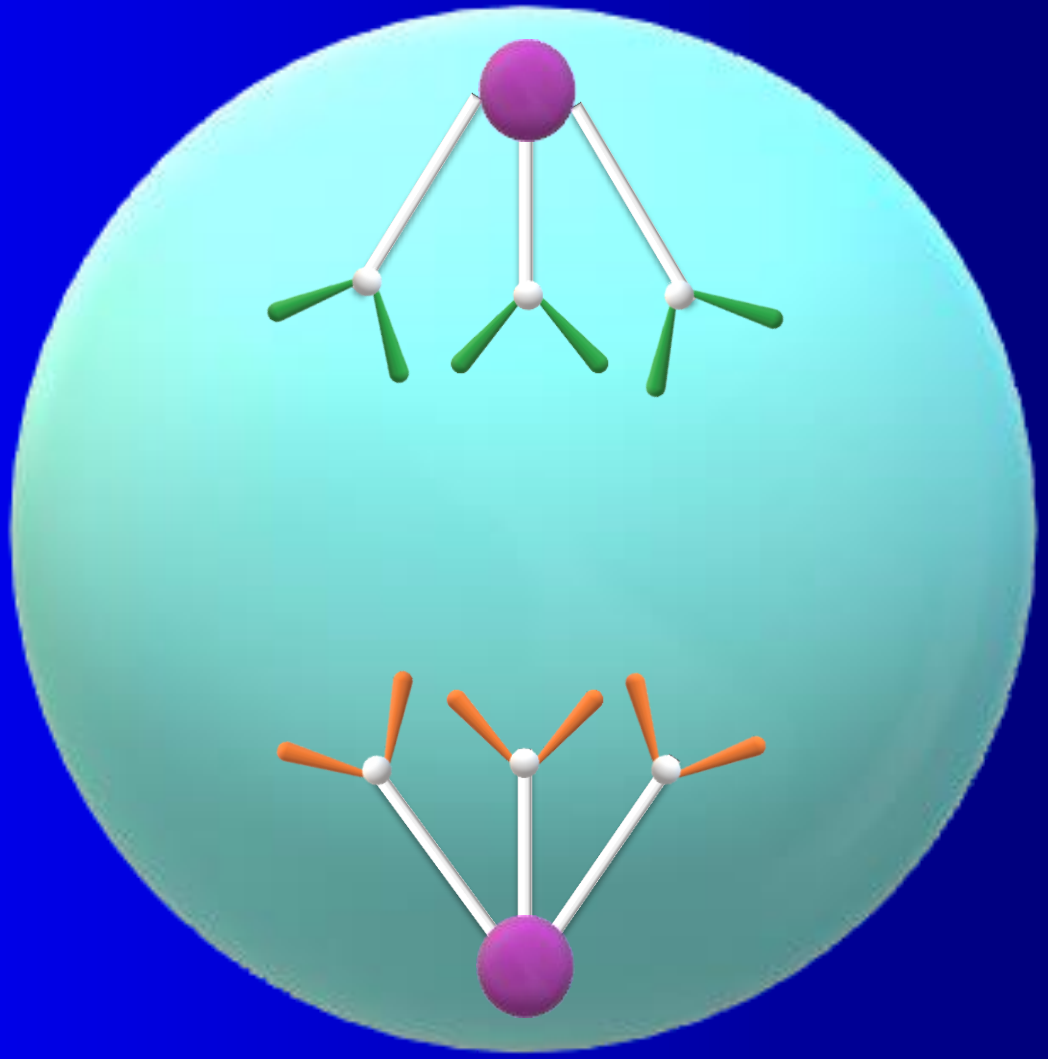
Contraction
of
Spindle Fibres

Splitting of
Centromeres

Movement of
Chromosomes

B. John Ebenezer

Anaphase



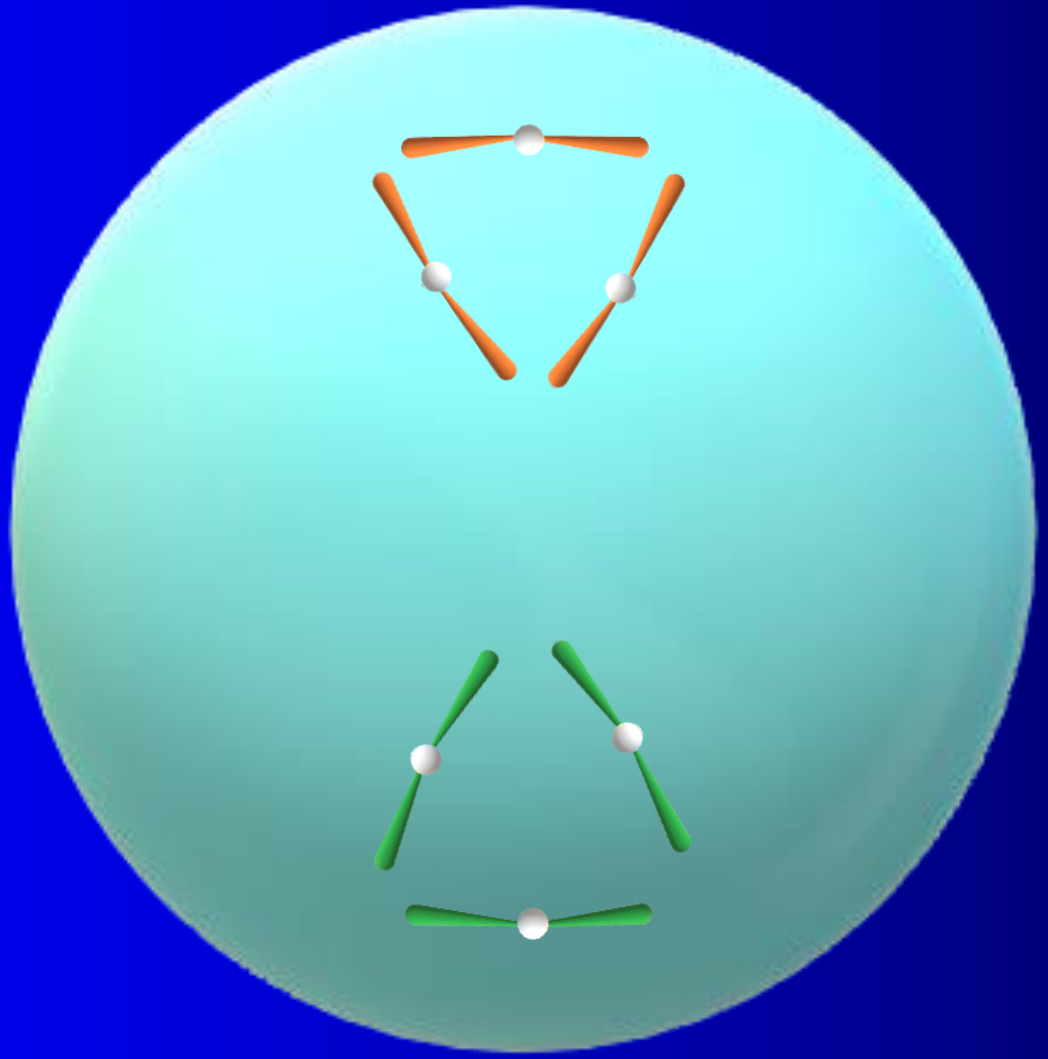
Contraction
of
Spindle Fibres

Splitting of
Centromeres

Movement of
Chromosomes

B. John Ebenezer

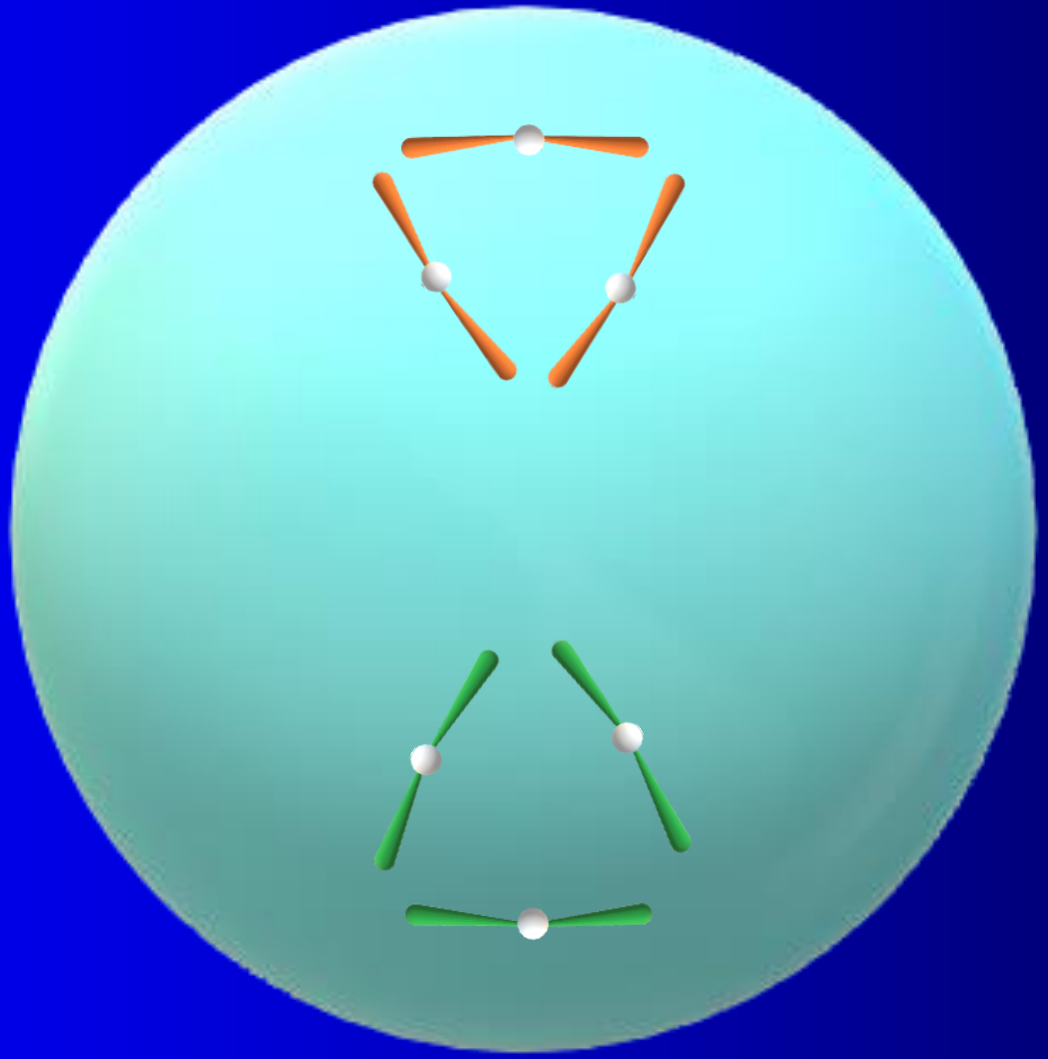
Anaphase



Disappearance of Centrioles and Spindle Fibres

B. John Ebenezer

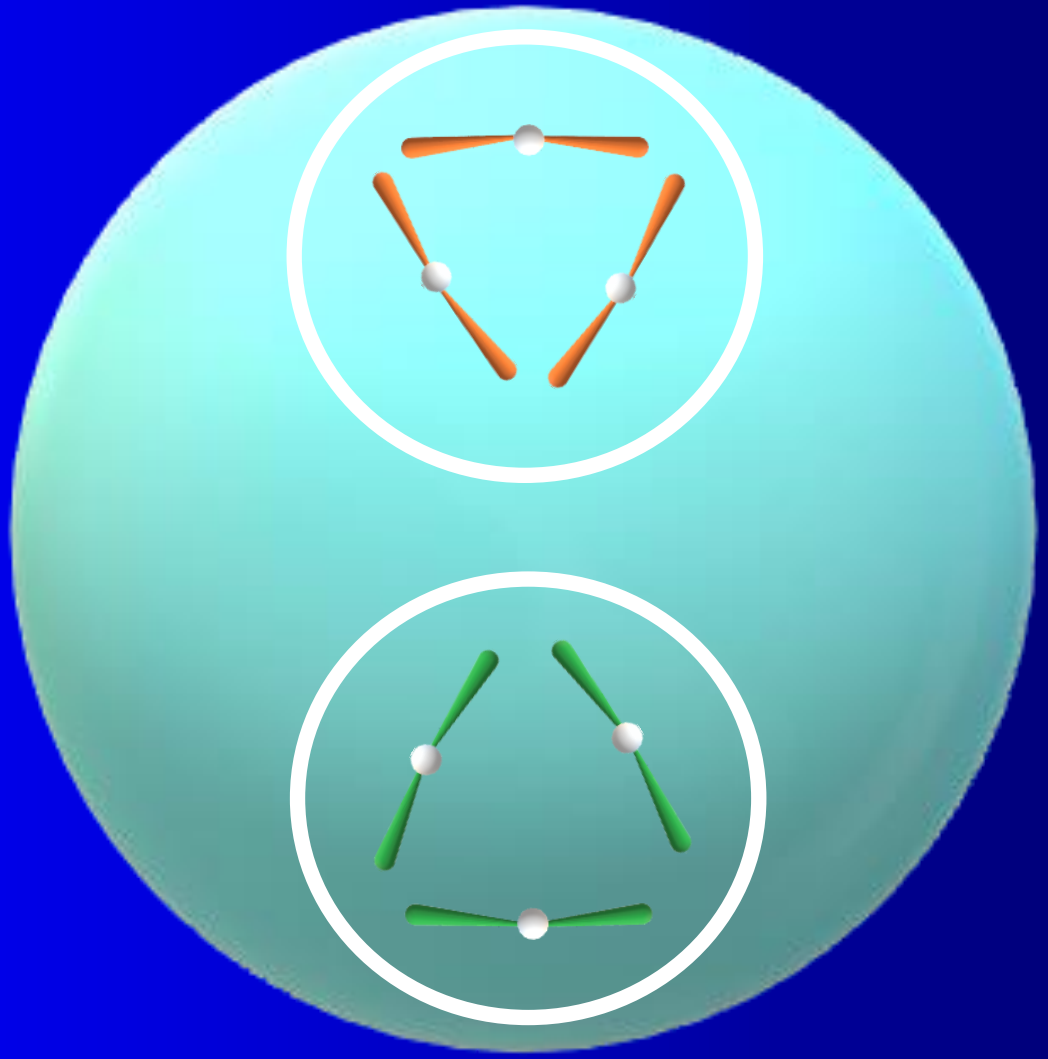
Anaphase



Chromosomes reached the opposite poles completely

B. John Ebenezer

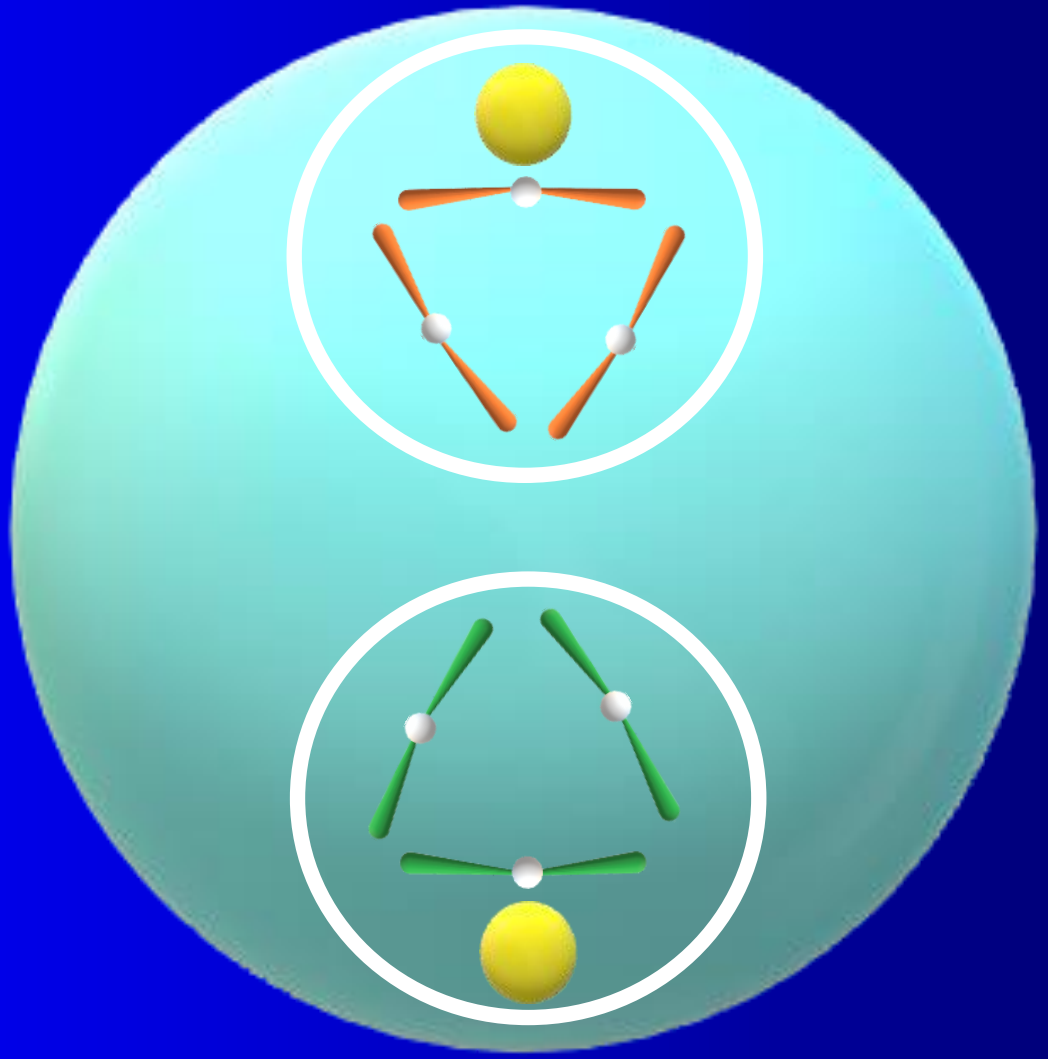
Telophase



Reappearance of Nuclear membrane

B. John Ebenezer

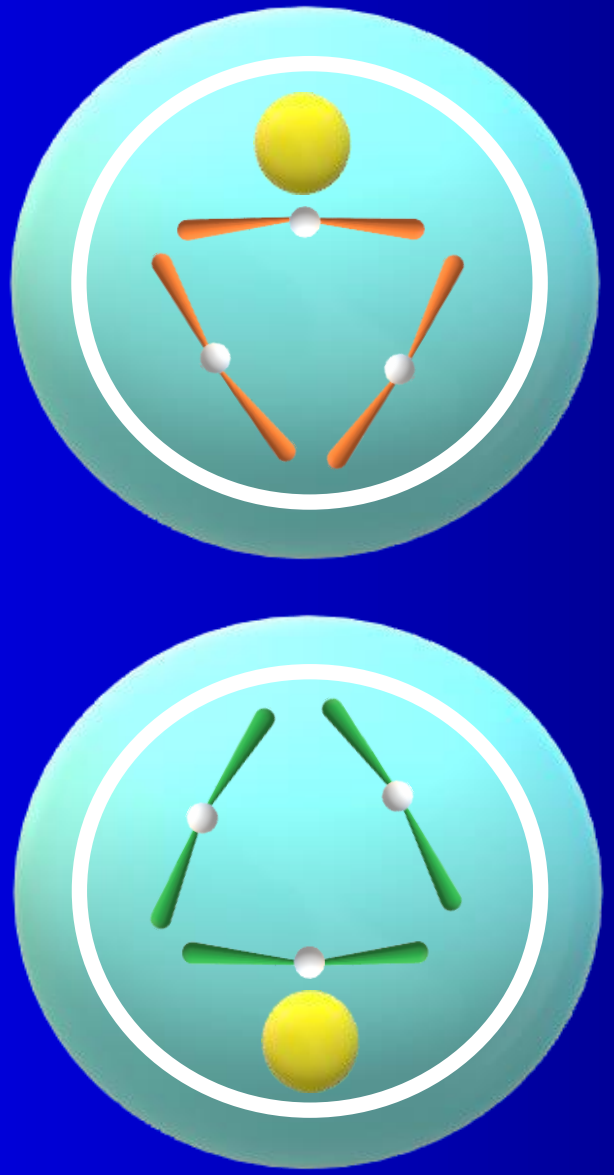
Telophase



Reappearance of Nucleolus

B. John Ebenezer

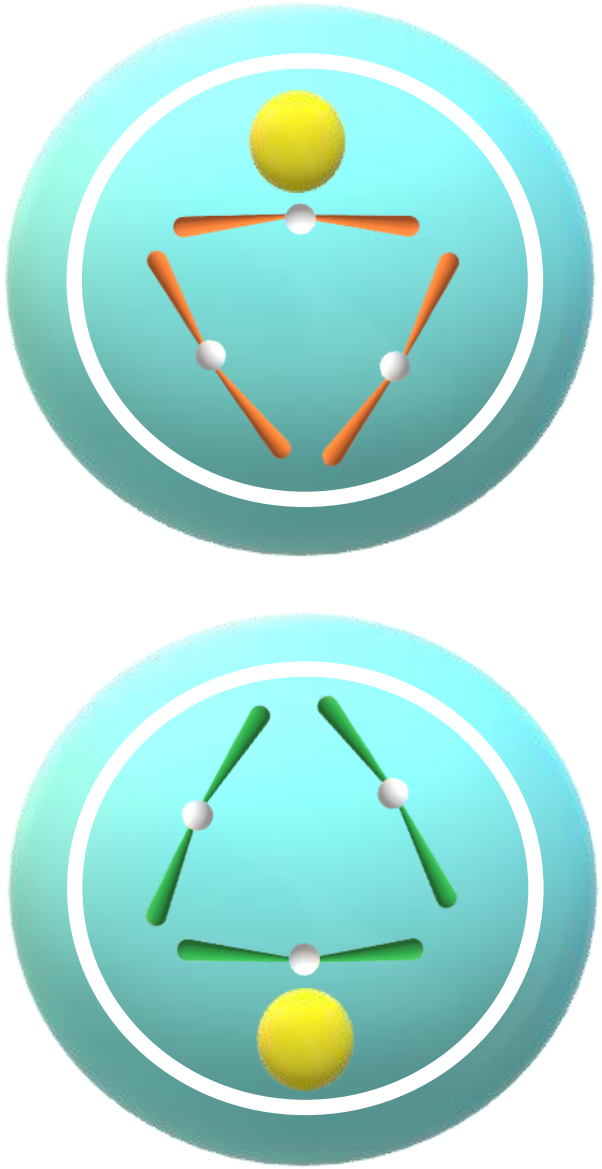
Telophase



Two Nuclei are formed

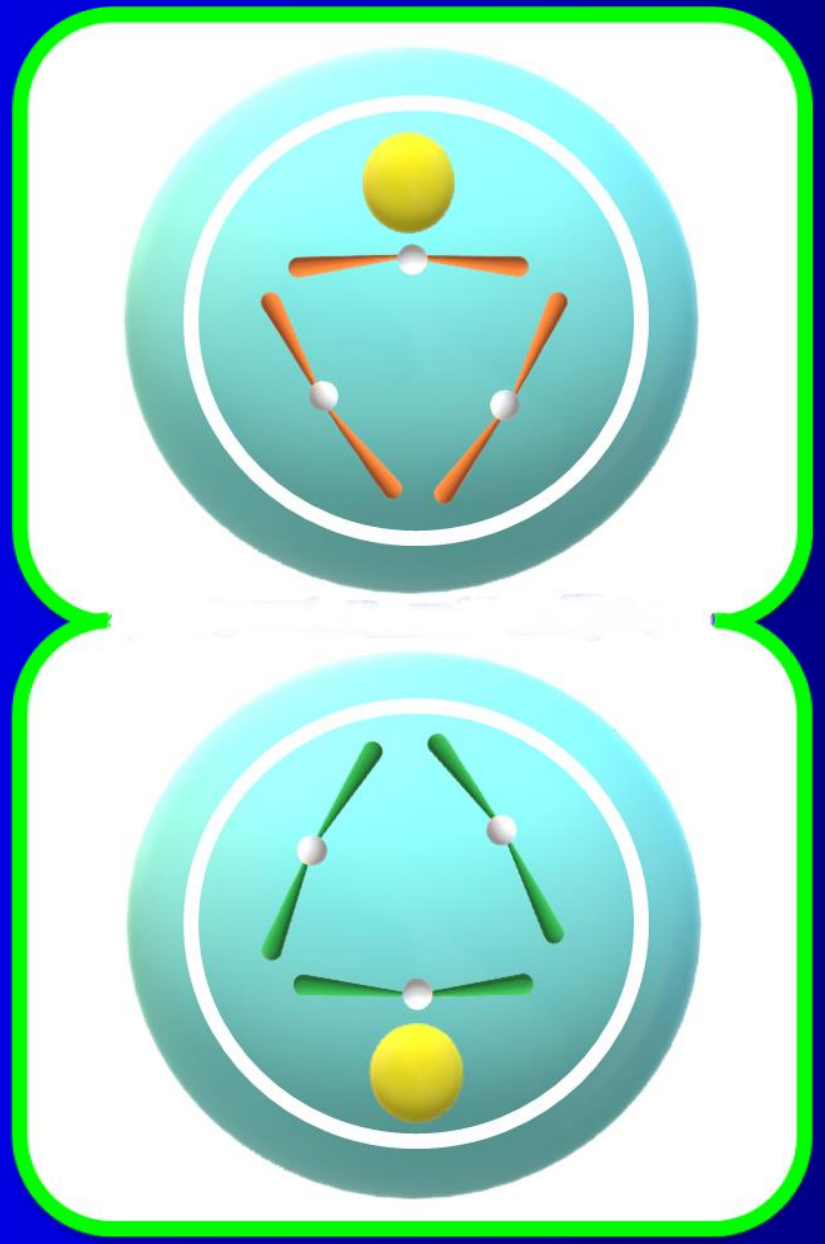
B. John Ebenezer

Cytokinesis



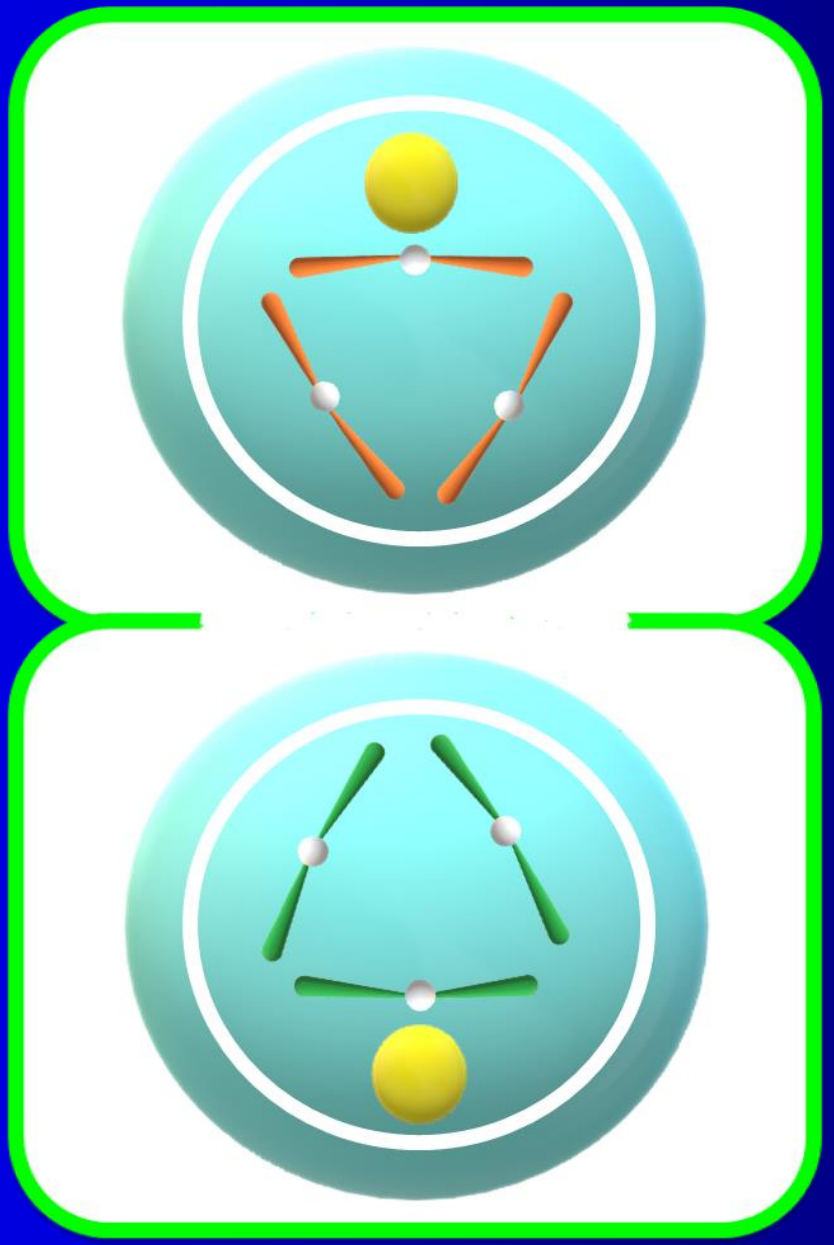
B. John Ebenezer

Cytokinesis



B. John Ebenezer

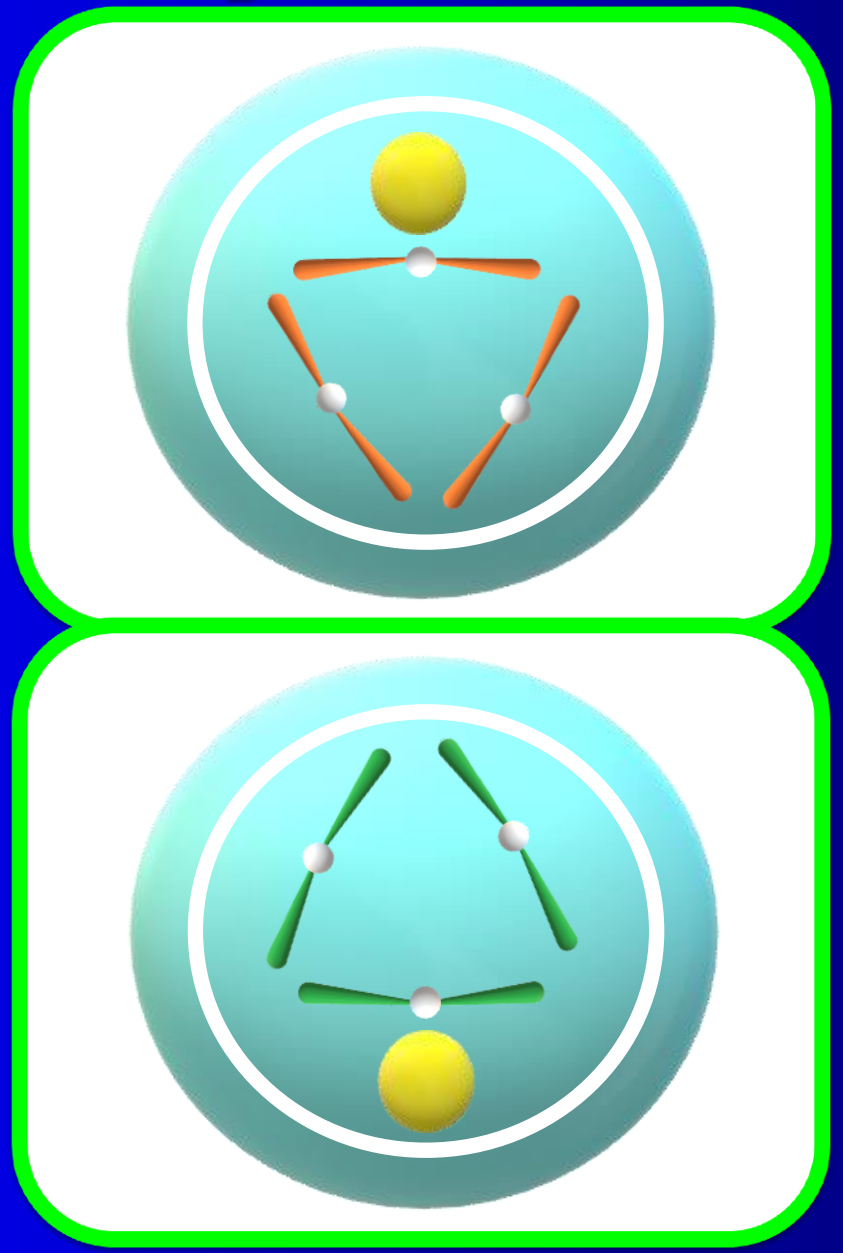
Cytokinesis



B. John Ebenezer

Cytokinesis

Constriction of cell Membrane



Formation of Two Daughter Cells

B. John Ebenezer

Cytokinesis

Two Daughter Cells are formed

B. John Ebenezer

God Bless You!